

Supplementary Materials

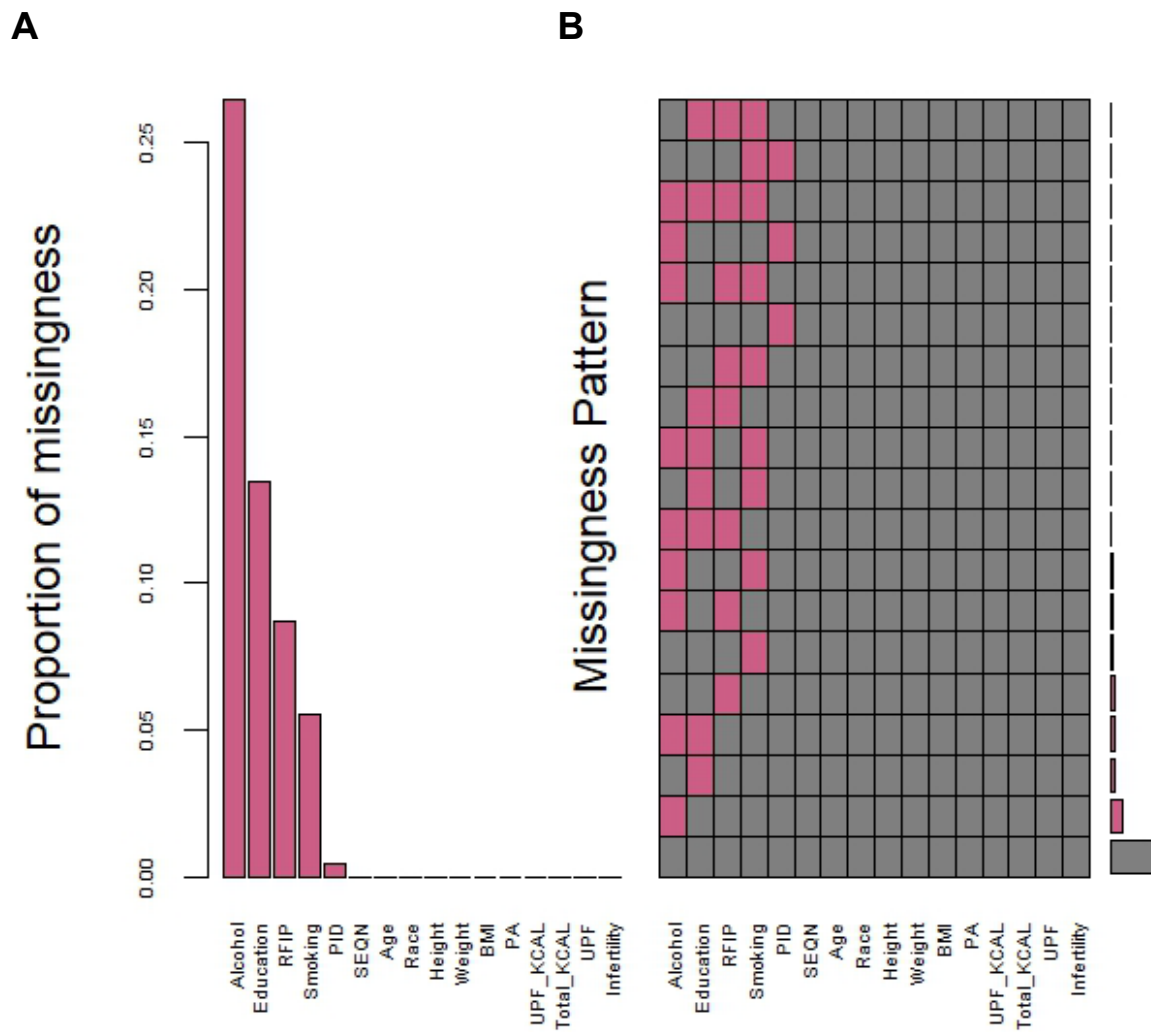


Figure S1. Distribution of missing data for the control group. (A) The number of missing data for each variable. (B) Missing data distribution pattern. The grey rectangle indicates that the data is not missing, and the red rectangle indicates that the data is missing; the right Y-axis represents the percentage of missing data for the corresponding variable at X-axis. If there are more than one red rectangle in the same row, there are one or more corresponding variables missing simultaneously.

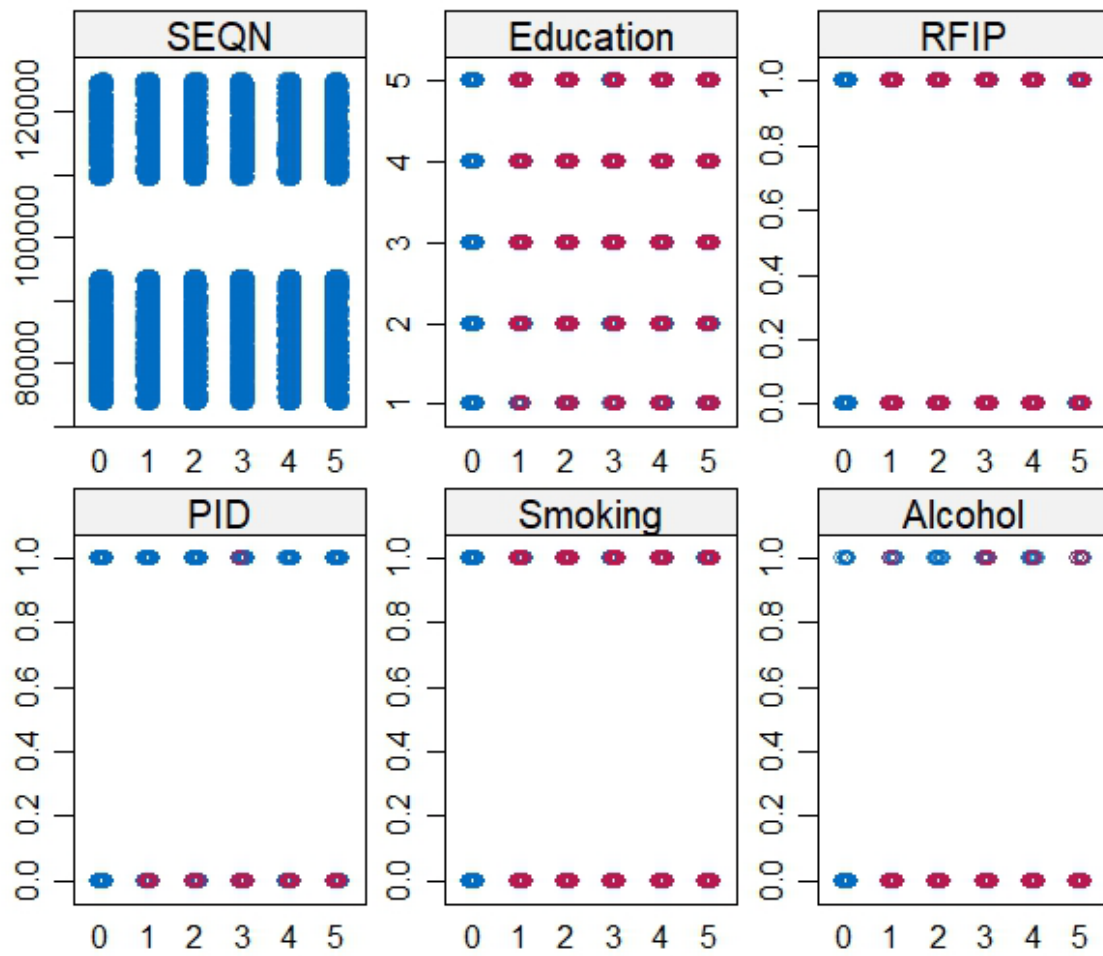


Figure S2. Five results of multiple imputation for the control group. After multiple imputation, a total of 5 complete datasets were constructed. Blue circles represent known observed data, and red circles are imputed data. The Y-axis represents the numerical distribution of variables; the X-axis represents different interpolation cycles, and each cycle generates a complete data. The red circle and the blue circle basically coincide, indicating that the imputed data is unlikely to cause a deviation in the data distribution.

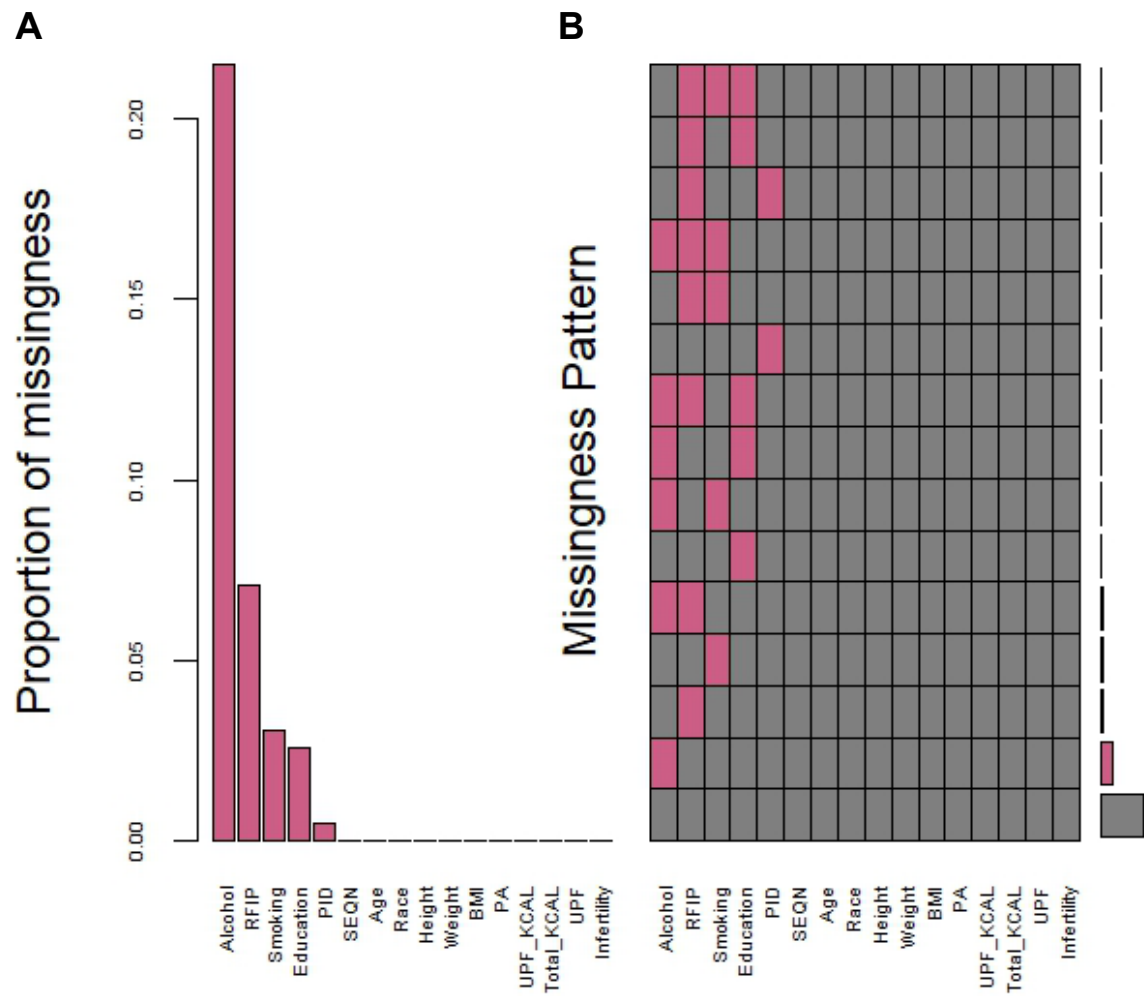


Figure S3. Distribution of missing data for the infertility group. (A) The number of missing data for each variable. (B) Missing data distribution pattern. The grey rectangle indicates that the data is not missing, and the red rectangle indicates that the data is missing; the right Y-axis represents the percentage of missing data for the corresponding variable at X-axis. If there are more than one red rectangle in the same row, there are one or more corresponding variables missing simultaneously.

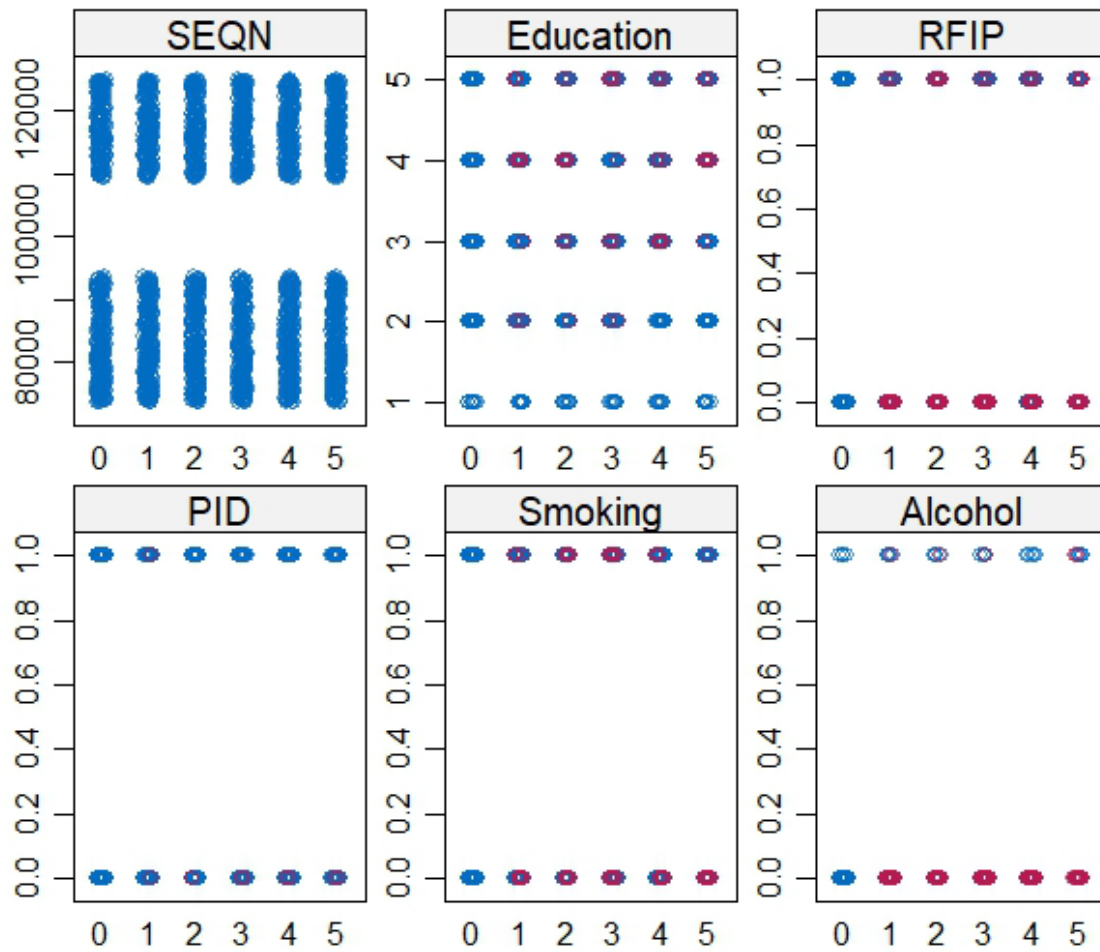


Figure S4. Five results of multiple imputation for the infertility group. After multiple imputation, a total of 5 complete datasets were constructed. Blue circles represent known observed data, and red circles are imputed data. The Y-axis represents the numerical distribution of variables; the X-axis represents different interpolation cycles, and each cycle generates a complete data. The red circle and the blue circle basically coincide, indicating that the imputed data is unlikely to cause a deviation in the data distribution.

Table S1. The NOVA food classification.

Food groups and definition	Examples
1 Unprocessed and minimally processed foods	
Unprocessed foods are of plant origin (leaves, stems, roots, tubers, fruits, nuts, seeds), or animal origin (meat, other flesh, tissue and organs, eggs, milk), shortly after harvesting, gathering, slaughter or husbanding. Minimally processed foods are unprocessed foods altered in ways that do not add or introduce any substance, but that may involve subtracting parts of the food in ways that do not significantly affect its use. Minimal processes include cleaning, scrubbing, washing; winnowing, hulling, peeling, grinding, grating, squeezing, flaking; skinning, boning, carving, portioning, scaling, filleting; drying, skimming, fat reduction; pasteurization, sterilizing; chilling, refrigerating, freezing; sealing, bottling (as such); simple wrapping, vacuum and gas packing. Malting, which adds water, is a minimal process, as is fermenting, which adds living organisms, when it does not generate alcohol.	Fresh, chilled, frozen, vacuum-packed vegetables and fruits; grains (cereals) including all types of rice; fresh, frozen and dried beans and other legumes (pulses), roots and tubers; fungi; dried fruits and freshly prepared or pasteurized non-reconstituted fruit juices; unsalted nuts and seeds; fresh, dried, chilled, frozen meats, poultry, fish, seafood; dried, fresh, pasteurized full-fat, low-fat, skimmed milk, fermented milk such as plain yoghurt; eggs; teas, coffee, herb infusions; tap, filtered, spring, mineral water.
2 Processed culinary ingredients	
Processed culinary ingredients are food products extracted and purified by industry from constituents of foods, or else obtained from nature, such as salt. Specific processes include pressing, milling, pulverizing. Stabilizing or ‘purifying’ agents and other additives may also be used.	Plant oils; animal fats; sugars and syrups; starches and flours, uncooked ‘raw’ pastas made from flour and water, salt.
3 Processed foods	
Manufactured by adding substances like oil, sugar or salt to whole foods, to make them durable and more palatable and attractive. Directly derived from foods and recognizable as versions of the original foods. Generally produced to be consumed as part of meals or dishes, or may be used, together with ultra-processed products, to replace food-based freshly prepared dishes and meals. Processes include canning and bottling using oils, sugars or syrups, or salt, and methods of preservation such as salting, salt-pickling, smoking, and curing.	Canned or bottled vegetables and legumes (pulses) preserved in brine; peeled or sliced fruits preserved in syrup; tinned whole or pieces of fish preserved in oil; salted nuts; un-reconstituted processed meat and fish such as ham, bacon, smoked fish; cheese.
4 Ultra-processed foods	
Formulated mostly or entirely from substances derived from foods. Typically contain little or no whole foods. Durable, convenient, accessible, highly or ultra-	Chips (crisps), many types of sweet, fatty or salty snack products; ice cream, chocolates, candies (confectionery); French fries (chips),

palatable, often habit-forming. Typically, not recognizable as versions of foods, although may imitate the appearance, shape and sensory qualities of foods. Many ingredients are not available in retail outlets. Some ingredients directly derived from foods, such as oils, fats, flours, starches, and sugar. Others obtained by further processing of food constituents. Numerically most ingredients are preservatives; stabilizers, emulsifiers, solvents, binders, bulkers; sweeteners, sensory enhancers, colors and flavors; processing aids and other additives. Bulk may come from added air or water. Micronutrients may 'fortify' the products. Most are designed to be consumed by themselves or in combination as snacks. They displace food-based freshly prepared dishes, meals. Processes include hydrogenation, hydrolysis; extruding, molding, reshaping; pre-processing by frying, baking.

burgers and hot dogs; poultry and fish 'nuggets' or 'sticks' ('fingers'); breads, buns, cookies (biscuits); breakfast cereals; pastries, cakes, cake mixes; 'energy' bars; preserves (jams), margarines; desserts; canned, bottled, dehydrated, packaged soups, noodles; sauces; meat, yeast extracts; soft, carbonated, cola, 'energy' drinks; sugared, sweetened milk drinks, condensed milk, sweetened including 'fruit' yoghurts; fruit and fruit 'nectar' drinks; instant coffee, cocoa drinks; no-alcohol wine, beer; pre-prepared meat, fish, vegetable, cheese, pizza, pasta dishes; infant formulas, follow-on milks, other baby products; 'health', 'slimming' products such as powdered or 'fortified' meal and dish substitutes.